

What is claimed is:

1. An apparatus for clutch braking in a multi-speed transmission, comprising:
a prime mover;
5 a transmission system comprising,
a first stage and a second stage, said first stage comprising at least two range
clutches and said second stage comprising at least two direction clutches, wherein
one of said range clutches and one of said direction clutches are kinematically
locked and at least one other range clutch is slipped and at least one other
10 direction clutch is slipped to brake said transmission system;
an output shaft connected to said second stage; and
a torque converter connecting said prime mover and said transmission.
2. The apparatus of claim 1, wherein said direction clutches comprise at least
15 one forward clutch and at least one reverse clutch.
3. The apparatus of claim 1, wherein said direction clutches comprise at least
one forward clutch and said at least one reverse clutch and wherein said
forward clutch is kinematically locked with one of said range clutches and
20 said reverse clutch and at least one of said other range clutches are slipped to
brake said transmission system.

4. The apparatus of claim 1, wherein said prime mover is an internal combustion engine that is de-throttled to provide braking to said transmission system through said torque converter.
- 5 5. The apparatus of claim 1, wherein said directional clutches have a higher heat absorbing capacity and a higher heat removing capacity than said range clutches.
6. The apparatus of claim 1, wherein at least one selectively operated pump in
10 fluid communication with at least said directional clutches provides lubricating fluid to said clutches.
7. An apparatus for clutch braking in a multi-speed transmission, comprising:
a prime mover;
15 a transmission system comprising,
a first stage and a second stage, said first stage comprising at least two range clutches and said second stage comprising at least two direction clutches, wherein at least two of said range clutches are locked together and said directional clutches are slipped about said range clutches to brake said transmission system;
20 an output shaft connected to said second stage; and
a torque converter connecting said prime mover and said transmission.

8. The apparatus of claim 7, wherein at least two of said range clutches are locked together so that relative motion between them is zero.
9. The apparatus of claim 7, wherein any combination of said range clutches can be locked together.
10. The apparatus of claim 7, wherein said directional clutches comprise at least one forward clutch and at least one reverse clutch which are both slipped about said at least two locked range clutches to brake said transmission system.
11. The apparatus of claim 7, wherein said directional clutches have a higher heat absorbing capacity and a higher heat removing capacity than said range clutches.
12. The apparatus of claim 7, wherein at least one selectively operated pump in fluid communication with at least said directional clutches provides lubricating fluid to said clutches.

13. An apparatus for clutch braking in a multi-speed transmission, comprising:

a prime mover;

a transmission system comprising,

a first stage and a second stage, said first stage comprising at least two range

5 clutches and said second stage comprising at least two direction clutches, wherein

said range clutches are opened and one of said directional clutches is locked, and

the remaining direction clutches are slipped to brake said transmission system;

an output shaft connected to said second stage; and

a torque converter connecting said prime mover and said transmission.

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14. The apparatus of claim 13, wherein the smallest of the at least three direction
clutches is locked.

15. The apparatus of claim 13, wherein a forward direction clutch is locked while
15 at least a reverse direction clutch is slipped.

16. The apparatus of claim 13, wherein said torque converter remains open.

17. The apparatus of claim 13, wherein said prime mover is an internal
20 combustion engine that operates independently of said transmission system.

18. The apparatus of claim 13, wherein all of said direction clutches are slipped to
brake said transmission system.

19. The apparatus of claim 13, wherein at least one selectively operated pump in fluid communication with at least said directional clutches provides lubricating fluid to said clutches.

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